

<<随机金融概要>>

图书基本信息

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## 前言

The author's intention was: to select and expose subjects that can be necessary or useful to those interested in stochastic calculus and pricing in models of financial markets operating under uncertainty; to introduce the reader to the main concepts, notions, and results of stochastic financial mathematics; to develop applications of these results to various kinds of calculations required in financial engineering. The author considered it also a major priority to answer the requests of teachers of financial mathematics and engineering by making a bias towards probabilistic and statistical ideas and the methods of stochastic calculus in the analysis of market risks. The subtitle "Facts, Models, Theory" appears to be an adequate reflection of the text structure and the author's style, which is in large measure a result of the 'feedback' with students attending his lectures (in Moscow, Zurich, Aarhus,...). For instance, an audience of mathematicians displayed always an interest not only in the mathematical issues of the 'Theory', but also in the 'Facts', the particularities of real financial markets, and the ways in which they operate. This has induced the author to devote the first chapter to the description of the key objects and structures present on these markets, to explain there the goals of financial theory and engineering, and to discuss some issues pertaining to the history of probabilistic and statistical ideas in the analysis of financial markets. On the other hand, an audience acquainted with, say, securities markets and securities trading showed considerable interest in various classes of stochastic processes used (or considered as prospective) for the construction of models of the dynamics of financial indicators (prices, indexes, exchange rates, ...) and important for calculations (of risks, hedging strategies, rational option prices, etc.). This is what we describe in the second and the third chapters, devoted to stochastic 'Models' both for discrete and continuous time. The author believes that the discussion of stochastic processes in these chapters will be useful to a broad range of readers, not only to the ones interested in financial mathematics. We emphasize here that in the discrete-time case, we usually start in our description of the evolution of stochastic sequences from their Doob decomposition into predictable and martingale components. One often calls this the 'martingale approach'. Regarded from this standpoint, it is only natural that martingale theory can provide financial mathematics and engineering with useful tools.

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## 内容概要

本书主要目的有三，一、研究随机分析必备内容以及不确定性下金融市场操纵模型中的估价；二、介绍主要概念、观点以及随机金融数学结果；三、讲述结果在金融工程各种计算中的应用。

本书为金融数学和工程数学的读者提供了概率统计的基本观点和随机分析市场风险的分析方法。书中不仅涵盖了金融中能够运用到的概率内容，也介绍了数学金融中的最新进展。

既讲述了金融理论又结合金融实践，脉络清晰流畅。

每部分的讲解从特殊到一般，从实例到结果。

综合性强，包含了数学金融、熵以及马尔科夫理论。

第二部分的学习需要对随机微积分知识有相当的了解。

目次：第一部分：事实，模型：主要概念、结构和工具，金融理论目标和问题以及金融工程；随机模型，离散时间；随机模型，连续时间；金融数据统计分析；第二部分：理论：随机金融模型中的套利原理，离散时间；随机金融模型中的价格理论，离散时间；随机金融模型中的随意理论，连续时间；随机金融模型中的价格理论，连续时间。

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书籍目录

Foreword

Part 1. Facts. Models Chapter I Main Concepts, Structures, and Instruments. Aims and Problems of Financial Theory and Financial Engineering

1. Financial structures and instruments 1a. Key objects and structures 1b. Financial markets 1c. Market of derivatives. Financial instruments 2. Financial markets under uncertainty. Classical theories of the dynamics of financial indexes, their critics and revision. Neoclassical theories 2a. Random walk conjecture and concept of efficient market 2b. Investment portfolio. Markowitz's diversification 2c. CAPM: Capital Asset Pricing Model 2d. APT: Arbitrage Pricing Theory 2e. Analysis, interpretation, and revision of the classical concepts of efficient market. I 2f. Analysis, interpretation, and revision of the classical concepts of efficient market. 3. Aims and problems of financial theory, engineering, and actuarial calculations 3a. Role of financial theory and financial engineering. Financial risks 3b. Insurance: a social mechanism of compensation for financial losses 3c. A classical example of actuarial calculations: the Lundberg-Cramér theorem

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Distinguishing between 'chaotic' and 'stochastic' sequences

Chapter Stochastic Models. Continuous Time

Chapter Statistical Analysis of Financial Data

Chapter V. Theory of Arbitrage in Stochastic Financial Models Discrete Time

Chapter Theory of Pricing in Stochastic Financial Models. Discrete Time

Chapter Theory of Arbitrage in Stochastic Financial Chapter Theory of Pricing in Stochastic Financial Bibliography

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## 章节摘录

插图：Central points there are the First and the Second fundamental asset pricing theorems. The First theorem states (more or less) that a financial market is arbitrage-free if and only if there exists a so-called martingale (risk-neutral) probability measure such that the (discounted) prices make up a martingale with respect to it. The Second theorem describes arbitrage-free markets with property of completeness, which ensures that one can build an investment portfolio of value replicating faithfully any given pay-off. Both theorems deserve the name fundamental for they assign a precise mathematical meaning to the economic notion of an 'arbitrage-free' market on the basis of (well-developed) martingale theory. In the sixth and the eighth chapters we discuss pricing based on the First and the Second fundamental theorems. Here we follow the tradition in that we pay much attention to the calculation of rational prices and hedging strategies for various kinds of (European or American) options, which are derivative financial instruments with best developed pricing theory. Options provide a perfect basis for the understanding of the general principles and methods of pricing on arbitrage-free markets. Of course, the author faced the problem of the choice of 'authoritative' data and the mode of presentation.

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